

CLAIMS:

1. A portable communication device comprising:
an earpiece speaker,
a loudspeaker,
5 a circuit coupled to the earpiece speaker, and the loudspeaker, said circuit comprising:
a signal source for generating a signal for driving the loudspeaker,
wherein said signal source is coupled to the loudspeaker; and
a cancellation filter, wherein said signal source is further coupled to the
10 earpiece speaker through a cancellation filter.
2. The portable communication device according to claim 1 further comprising:
a common acoustic resonator coupled to the earpiece speaker, and to the
loudspeaker.
- 15 3. The portable communication device according to claim 1 wherein:
the cancellation filter comprises a digital filter.
4. The portable communication device according to claim 3 wherein:
20 the circuit comprises, a processor;
the signal source comprises a software implemented signal source; and
the cancellation filter comprises a software implemented digital filter.
5. A portable communication device comprising:
25 an earpiece speaker;
a loudspeaker;
an acoustic resonator acoustically coupled to the earpiece speaker and the
loudspeaker;
a first amplifier drivingly coupled to the earpiece speaker;
30 a second amplifier drivingly coupled to the loudspeaker;
a first digital to analog converter drivingly coupled to the first amplifier;

a second digital to analog converter drivingly coupled to the second amplifier;
a processor coupled to the first digital to analog converter, and coupled to the
second digital to analog converter wherein the processor is programmed to:

- 5 apply a loudspeaker drive signal to the second digital to analog converter;
 apply a cancellation filter to the drive signal to obtained a cancellation filtered
drive signal; and
 apply the cancellation filtered drive signal to the first analog to digital
converter.

- 10 6. The portable communication device according to claim 5 wherein:
 in applying the cancellation filter to the drive signal, the processor is
programmed to apply a finite impulse response filter to the drive signal.

- 15 7. The portable communication device according to claim 5 wherein:
 the acoustic resonator comprises an opening for coupling acoustic energy from
the earpiece speaker to a user's ear.

- 20 8. A method of operating a portable communication device, the method
comprising:
 applying a drive signal to a loudspeaker of the portable communication
device:
 cancellation filtering the drive signal with a cancellation filter to obtained a
cancellation filtered drive signal;
 driving an earpiece speaker of the portable communication device with the
25 cancellation filtered drive signal;
 whereby, a level of sound emanating from the loudspeaker, and coupled to a
user's ear is reduced.

- 30 9. The method according to claim 8 further comprising:
 prior to applying the drive signal to the loudspeaker, delaying the drive signal.

10. The method according to claim 8 wherein:

5 cancellation filtering comprises, filtering with a cancellation filter that is characterized by a first frequency response that, when compounded with a second frequency response that characterizes electrical to acoustic transducing response of the earpiece speaker, substantially negates a third frequency response that characterizes electrical to acoustic transducing response of the loudspeaker as measured with an ear simulator.

11. The method according to claim 10 wherein:

10 cancellation filtering comprises digitally filtering with a finite impulse response filter.